

# AUSTRALIAN PATENT OFFICE

## WRITTEN OPINION



\*175175\*

Date of mailing <i>day/month/year</i> <b>26 OCT 2007</b>	
Applicant's or agent's file reference <b>SP8044</b>	<b>REPLY DUE</b> within FIVE MONTHS of the date of the Registrar's letter enclosing the written opinion
Application No. <b>SG 200606183-2</b>	Application Filing Date ( <i>day/month/year</i> ) <b>17 March 2005</b>
Priority Date ( <i>day/month/year</i> ) <b>24 March 2004</b>	
International Patent Classification (IPC) (as indicated in the search report) <b>Int. Cl.</b> <b>B05D 1/18 (2006.01) H01L 21/302 (2006.01) B05D 1/18 (2006.01)</b> Action Date: 15 October 2007	
Applicant <b>THE BOC GROUP, INC. (DW, US)</b>	

1. This First written opinion consists of a total of 6 sheets.	
2. This opinion contains indications relating to the following items:	 *G00001*
I <input checked="" type="checkbox"/> Basis of the opinion	
II <input type="checkbox"/> Priority	
III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	
IV <input type="checkbox"/> Lack of unity of invention	
V <input checked="" type="checkbox"/> Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	
VI <input type="checkbox"/> Certain documents cited	
VII <input type="checkbox"/> Certain defects in the application	 *ACTION*
VIII <input checked="" type="checkbox"/> Certain observations on the application	
3. The search report used was issued by the <b>Australian Patent Office</b> , and the date of completion is: <b>15 October 2007</b>	
4. If no reply is filed, the examination report will be established on the basis of this opinion.	
5. The date by which the examination report will be established is: <b>24 December 2008</b>	

Name and mailing address AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile no. 61 2 62853929	Authorized Officer  <b>JAYATI RAY</b>
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**I. Basis of the opinion**

1. This opinion has been drawn on the basis of:

☒ the application as originally filed.

☐ the description, pages , as originally filed,  
pages , filed with the request,  
pages , received on with the letter of

☐ the claims, pages , as originally filed,  
pages , filed with the request,  
pages , received on with the letter of

☐ the drawings, sheets/fig. , as originally filed,  
sheets/fig. , filed with the request,  
sheets/fig. , received on with the letter of

☐ the sequence listing part of the description:  
pages , as originally filed  
pages , filed with the demand  
pages , received on with the letter of

2. The amendments have resulted in the cancellation of: pages:  
sheets of drawings/figures No :

3 ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box.

4. Additional observations, if necessary:

**V. Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Claims	YES
	Claims 1-22	NO
Inventive step (IS)	Claims	YES
	Claims 1-22	NO
Industrial applicability (IA)	Claims 1-22	YES
	Claims	NO

**2. Citations and explanations**

The following documents identified in Singapore Search Report have been considered for the purpose of this opinion:

- D1: US 2002/0094686 A1 (GORCZYCA ET AL.) 18 July 2002  
D2: US 2003/0118731 A1 (HE ET AL.) 26 June 2003  
D3: EP 1158072 A1 (NGK INSULATORS, LTD) 28 November 2001  
D4: US 6565667 B2 (HAERLE ET AL.) 20 May 2003

**NOVELTY**

D1 discloses a process of producing a substrate that is suitable for use in semi-conductor processing (paragraph 0001). The process comprises the steps of a) roughening the surface of the substrate material (paragraph 0012) ; b) treating the roughened surface to remove at least substantially all particles of the substrate material remaining on the roughened surface (paragraphs 0022 & 0033); and c) coating the roughened surface with a coating composition containing at least one metal oxide (paragraphs 0002 & 0023). Thus, all features of claim 1 are disclosed in D1.

With respect to claims 2-3 and 5-22, D1 discloses that the substrate is comprised of a quartz material (paragraph 0005). The coating composition is selected from silicon dioxide, silicon nitride (paragraph 0002). The metal oxide coating is applied to the roughened surface by using LPCVD (paragraph 0022). The process further comprises the steps of generating the plasma in the presence of compressed air and temperature from about 65 to 85°C (paragraph 0024). The plasma generating gas is nitrogen (paragraph 0024). The process of roughening the surface of the substrate material comprises the step of contacting the substrate material with roughening material particles to produce a surface roughness within the range as disclosed in claims 9-10 (paragraph 0018). The process of treating the roughened surface comprises the step of immersing the substrate in a high concentration, strong acid containing immersion bath (paragraph 0028). The concentration of the strong acid is within the range as disclosed in claims 12-13 (paragraph 0028). The immersion bath comprises acetic acid and hydrofluoric acid (paragraph 0028). The process further comprises the steps of removing the substrate from the immersion bath and cleaning the substrate (paragraph 0033). The depth of the micro-fissures is within the range as disclosed in claims 16-17 (paragraph 0022). The thickness of the coating is sufficient to fill and cover the micro-fissures (paragraph 0023). The thickness of the coating is up to about 0.010 inch (paragraph 0023). The coating is a dielectric coating (paragraph 0002).

Continued in Supplemental Box I

**VIII. Certain observations on the application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

☒ The claimed invention is patentable according to Section 13(2); or

☐ The claimed invention is unpatentable according to Section 13(2) because:

☐ This application is a Divisional application filed under Section 26(6) of the Patents Act and discloses no additional matter extending beyond that disclosed in the Parent application.

**Supplemental Box I**

(To be used when the space in any of Boxes I to VIII is not sufficient)

**Continuation of Box V:**

D2 discloses a process (paragraph 0045) of producing a substrate that is suitable for use in semi-conductor processing (paragraph 0002). The process comprises the steps of a) roughening the surface of the substrate material (item 302) (paragraph 0028); b) treating the roughened surface to remove at least substantially all particles of the substrate material remaining on the roughened surface (paragraph 0033); and c) coating (item 304) the roughened surface with a coating composition containing at least one metal or metal compound (paragraph 0037). Thus, all features of claim 1 are disclosed in D2.

With respect to claims 2-3 and 5-21, D2 discloses that the substrate is comprised of a material selected from the group as disclosed in claim 2 (paragraph 0003). The coating composition is selected from titanium nitride, tantalum nitride (paragraph 0002). The metal oxide coating is applied to the roughened surface by using plasma arc method (paragraph 0037). The plasma generating gas is selected from the group as disclosed in claim 8 (paragraph 0049). The process of roughening the surface of the substrate material comprises the step of contacting the substrate material with roughening material particles to produce a surface roughness within the range as disclosed in claims 9-10 (paragraph 0030). The process of treating the roughened surface comprises the step of immersing the substrate in a high concentration, strong acid containing immersion bath (paragraph 0033). The concentration of the strong acid is within the range as disclosed in claims 12-13 (paragraph 0034). The immersion bath comprises acetic acid and hydrofluoric acid (paragraph 0035) and nitric acid (paragraph 0036). The process further comprises the steps of removing the substrate from the immersion bath and cleaning the substrate (paragraph 0033). The depth of the micro-fissures is within the range as disclosed in claims 16-17 (paragraph 0022). The thickness of the coating is sufficient to fill and cover the micro-fissures (paragraph 0037). The thickness of the coating is up to about 0.010 inch (paragraph 0037).

D3 discloses a process of producing a substrate that is suitable for use in semi-conductor processing (paragraph 0070). The process comprises the steps of a) roughening the surface of the substrate material (paragraph 0070); b) treating the roughened surface to remove at least substantially all particles of the substrate material remaining on the roughened surface (paragraph 0071); and c) coating the roughened surface with a coating composition containing at least one metal oxide (paragraph 0071). Thus, all features of claim 1 are disclosed in D3.

With respect to claims 2-7, 9-11 and 21-22, D3 discloses that the substrate is comprised of a ceramic material (paragraph 0007). The coating composition is selected from the group as disclosed in claims 3-4 (paragraphs 0035 & 0071). The metal oxide coating was applied to the roughened surface by using LPCVD (paragraph 0071). The process further comprises the steps of generating the plasma in the presence of compressed air and temperature about 1500°C (paragraph 0075). The plasma generating gas is selected from the group as disclosed in claim 8 (paragraphs 0059 & 0061). The process of roughening the surface of the substrate material comprises the step of contacting the substrate material with roughening material particles to produce a surface roughness within the range as disclosed in claims 9-10 (paragraph 0078). The roughened surface was treated with a strong acid (paragraph 0071). The coating is a dielectric coating (paragraph 0071).

Continued in Supplemental Box II

**Supplemental Box II**

(To be used when the space in any of Boxes I to VIII is not sufficient)

**Continuation of Supplemental Box I:****INVENTIVE STEP**

D4 discloses a process for producing a ceramic substrate that is suitable for use in semi-conductor processing (column 4, lines 9-12). The process comprises the steps of a) roughening the surface of the substrate material using bead-blasting (column 4, lines 65-66, column 7, lines 65-66); b) treating the roughened surface to remove at least substantially all particles of the substrate material remaining on the roughened surface (column 4, lines 28-37). D4 fails to disclose the steps of coating the roughened surface with a coating composition containing at least one metal oxide after cleaning. However, D4 discloses that the cleaning process can be used for removing the metallic particles from the surface of the ceramic work-piece before or after CVD coating (column 6, lines 34-37 & Examples). It is considered that it would be obvious to the person skilled in the art to clean the substrate using the method as disclosed in D2 before coating the substrate in order to provide strong bonding between the substrate and the coating, rendering claim 1 not inventive.

With respect to claims 2-3 and 11, 14 and 22, D4 discloses that the substrate is comprised of a material selected from the group as disclosed in claim 2 (column 6, lines 20-29). The coating composition is selected from silicon dioxide, silicon nitride (column 6, lines 31-34). The metal oxide coating is formed by using CVD (column 5, line 2). The process of treating the roughened surface comprises the step of immersing the substrate in a high concentration, strong acid containing immersion bath (column 7, lines 54-60). The immersion bath contains hydrofluoric acid (column 8, line 3). The process further comprises the steps of removing the substrate from the immersion bath followed by CO<sub>2</sub> cleaning of the substrate (column 7, lines 60-63). The depth of the micro-fissures is within the range as disclosed in claims 16-17 (paragraph 0022). The coating is a dielectric coating (column 6, lines 26-29).

**INDUSTRIAL APPLICABILITY**

The invention defined in claims 1-22 meets the requirements of Industrial Applicability because it can be made by, or used in, industry.

# AUSTRALIAN PATENT OFFICE

## SEARCH REPORT


Applicant's or agent's file reference SP8044		
Application No. SG 200606183-2	Application Filing Date ( <i>day/month/year</i> ) 17 March 2005	(Earliest) Priority Date ( <i>day/month/year</i> ) 24 March 2004
Applicant THE BOC GROUP, INC. (DW, US)		

This search report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (See Box I)
2. ☐ Unity of invention is lacking (See Box II)
3. ☐ The application contains disclosure of a nucleotide and/or amino acid sequence listing and the search was carried out on the basis of the sequence listing
 


☐ filed with the application
 

  
 \*172172\*

☐ furnished by the applicant separately from the application,
 

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in application as filed
4. With regard to the title,
 

☒ the text is approved as submitted by the applicant.  
☐ the text has been established by this Office to read as follows:
 

  
 \*G00002\*
5. With regard to the abstract,
 

☒ the text is approved as submitted by the applicant  
☐ the text has been established by this Office as it appears in Box III
6. The figure of the drawings to be published with the abstract is Figure No. 1
 

☒ as suggested by the applicant.  
☐ because the applicant failed to suggest a figure  
☐ because this figure better characterises the invention  
☐ None of the figures

# **AUSTRALIAN PATENT OFFICE**

## **SEARCH REPORT**

**Application No.**

**SG 200606183-2**

### **A. CLASSIFICATION OF SUBJECT MATTER**

According to International Patent Classification (IPC)

Int. Cl.

**B05D 1/18 (2006.01) H01L 21/302 (2006.01) B05D 3/10 (2006.01)**

### **B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

International Search Report of corresponding PCT Application no. PCT/US05/09108 and EP Search Report of corresponding EP patent (Application No. EP 05250218) family member have been considered

Electronic data base consulted during the search (name of data base and, where practicable, search terms used)

### **C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/0094686 A1 (GORCZYCA ET AL.) 18 July 2002 Paragraphs 0002, 0017, 0022, 0023 and 0028	1-3, 5-22
X	US 2003/0118731 A1 (HE ET AL.) 26 June 2003 Paragraph 0004	1-3, 5-21
X	EP 1158072 A1 (NGK INSULATORS, LTD) 28 November 2001 Paragraphs 0070 and 0071	1-7, 9-11 and 21-22

☒ Further documents are listed in the continuation of Box C

☒ See patent family annex

<p>* Special categories of cited documents:</p>	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of submission of the request to the Australian Patent Office 24 January 2008	Date of completion of the search report 15 October 2007	Date of mailing of the search report 26 OCT 2007
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Name and mailing address AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. 61 2 62853929	Authorised officer  <b>JAYATI RAY</b>
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## SEARCH REPORT

**SG 200606183-2**

Form APO/SG /210 (continuation of Box C) (March 1997)

Patent Document Cited in Search Report				Patent Family Member			
US	2002094686	US	6368410	US	6706205		
US	2003118731	CN	1496577	EP	1358666	US	6656535
		WO	03058672				
EP	1158072	JP	2002001865	JP	2002249864	US	6783875
		US	2002018921				
US	6565667	AU	24862/00	AU	77074/01	CN	1440322
		EP	1314188	US	6296716	US	6723437
		US	2002006766	US	2002168867	WO	0125167
		WO	0209161				
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.							
END OF ANNEX							